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Introduction

Governmental entities often acquire private property from citizens for public use. A common situation in which this occurs is in the construction of roads and highways. If the planned route of a new highway being constructed by a governmental entity crosses private property, the governmental entity has the right to acquire that property for its use. In the United States, this right of acquisition of private property for public use is called the law of eminent domain. Eminent domain is the right of the government to take private property for public use providing (1) a public need is shown and (2) the owner is justly compensated for the property taken (Suter). The power of eminent domain was in existence before the United States Constitution was written. Amendments to the constitution later placed restrictions on the use of eminent domain by governmental entities. The Fifth Amendment (1798)

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placed restrictions on the use of eminent domain by the federal government. This amendment states, "*No person shall be ... deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.*" The Fourteenth Amendment (1868) placed similar restrictions on the use of eminent domain by state governments. Thus, both federal and state governments must make just compensation to citizens whose private property is acquired by eminent domain for public use.

The Louisiana law concerning eminent domain is referred to as expropriation. Relevant statutory language concerning the state's expropriation law is found in Titles 19 and 48 of the Louisiana Revised Statutes (*West's Louisiana Statutes Annotated*). Section 2 of Title 19 defines conditions under which the state or certain corporations can expropriate private property for public use. The state of Louisiana, or its political corporations, may expropriate private property for the purpose of exercising any state governmental powers. This section of the statute also allows for expropriation by any domestic or foreign corporation created for the construction and operation of service facilities for public use. Some of these public service facilities include railroads, toll roads, navigation canals, street railways, urban and inter-urban railways, waterworks, filtration and treating plants, water and sewage plants, piping and marketing of natural gas, intelligence transmittal by telegraph or telephone, and generation and distribution of electricity and steam for power, lighting, heating, or other such uses. Section 48 gives the state's Department of Transportation and Development the authority to expropriate and acquire private property for construction of roads and bridges. Louisiana law also requires that owners of private property expropriated by the state must be compensated to the full extent of their loss.

Sugarcane is a major agricultural commodity in Louisiana. In 1998 sugarcane was grown on 427,930 acres by 804 producers in 23 parishes (Louisiana Cooperative Extension Service [LCES], 1998). An estimated 393,700 acres were harvested for sugar, with a total production of 1,241,994 tons of raw sugar. Gross farm income from sugarcane production totaled $306,548,920 in 1998, with an average sugar yield of 6,309 pounds per harvested acre.

Total value (gross farm income plus value added by processing) of the 1998 Louisiana sugarcane crop was estimated to be $502,740,229, representing approximately 7 percent of the total value of plant commodities produced in Louisiana (LCES, 1998). This value exceeds the production value of all other plant commodities in the state and ranks third behind forestry and poultry.

Sugarcane is a perennial grass crop. One planting of sugarcane generally provides several years of harvest before replanting is necessary. In Louisiana, a sugarcane crop is generally harvested for three to four years before the land is replanted. As a result of the perennial nature of sugarcane, when expropriation of agricultural cropland for public use occurs in sugarcane production areas, the tract of land in question very often includes a growing crop of sugarcane. In such a case, the producer of the growing sugarcane crop must be compensated for loss as well as the owner of the land itself. In most cases the producer of the growing sugarcane crop will be renting the land from the landowner.

The purpose of this bulletin is to present a method to value perennial crops associated with eminent domain acquisition of agricultural crop land. More specifically, it focuses on the estimation of the value of 'short-lived' perennial crops, crops that have a productive life over a relatively short, defined period of years, as opposed to permanent plantings, such as orchards or vineyards, which have a productive life over a considerably longer period. The particular case examined here involves perennial crop valuation methods for sugarcane production in Louisiana. However, the methodology presented here would also be applicable to other perennial crops such as fruit, nut, spice, and ornamental crops.

The following section of this bulletin provides a brief overview of special valuation considerations relevant to sugarcane production in Louisiana. The next section discusses valuation methods that can be used to place a value on growing perennial crops associated with the determination of compensation for eminent domain acquisition. Sugarcane value estimates for Louisiana are then presented using alternative valuation procedures. Three sugarcane production scenarios are presented that illustrate the impact of yield level and crop cycle length on the estimated sugarcane crop value.

The valuation procedures included in this bulletin estimate the present value of a producer's current investment in a growing crop of sugarcane. As such, the estimated crop values provide information that can be used in determining the compensation due a sugarcane producer from loss of crop through eminent domain land acquisition. They do not represent the estimated market value of the sugarcane crop. Additional information, drawn from comparable sales, is necessary to corroborate the relationship between the valuation estimates presented here and market value.

Special Considerations for Sugarcane Valuation

Sugarcane is produced in Louisiana over a four- to five-year crop cycle. Field operations begin in the spring of year 1 with fallow land tillage, which includes the plowing out of older crop stubble. Sometimes this practice is done in the fall immediately following harvest. Seedbed preparation continues through the summer months and concludes with the planting of seedcane stalks anytime from mid-August through early October.

Production of sugarcane in Louisiana begins with the planting of cultured, disease-free seedcane, which is usually purchased by the producer from a supplier. This cultured seedcane is planted and harvested the next year as propagated seedcane. One harvested acre of cultured seedcane will generally provide enough propagated seedcane sufficient to plant 5-8 acres of production cane. Cultured seedcane generally goes through two propagation cycles before being planted in fields for sugar production. Costs associated with fallow activities, seedbed preparation, and planting (including the cost of harvesting and replanting seedcane) can generally be considered to comprise total planting costs incurred in sugarcane production.

After planting in year 1, cultivation costs of the "plantcane" crop (the first harvested sugarcane crop after planting) continues until the first harvest the following fall of year 2. Cultivation costs of the "first stubble" and "second stubble" crops (the first and second crops after harvest of the plantcane crop) continue

through harvest in the fall of year 3 and year 4, respectively. If a third stubble crop is produced, cultivation costs will be incurred until harvest in year 5 of the crop cycle. The state average sugarcane yield for Louisiana in 1998 was 29.7 tons of sugarcane per acre (Louisiana Agricultural Statistics Service, 1998). Parish means ranged from 24.1 to 33.3 tons per acre. Average sugarcane yields in Louisiana have been increasing over the past several years. This increase in average yield is primarily due to the release and adoption of new, higher-yielding varieties of sugarcane.

Most of the sugarcane produced in Louisiana is grown on rented land. Although no recent data are available on the distribution of rented versus owned land in production, it is generally assumed that in excess of 75 percent to 80 percent of the sugarcane produced in Louisiana is grown on rented land. Share rent is the most common type of rental arrangement in use (although cash rent is used to some extent in the production area of southwest Louisiana just being established). A one-fifth crop share has traditionally been the most commonly found rental arrangement. In recent years, more and more producers have been renegotiating their rental arrangements to utilize a one-sixth crop share (Henning, et al., 1997).

To be reimbursed for the cost of processing sugarcane into raw sugar, sugar mills in Louisiana generally take a share of the crop as payment. This share is typically assumed to be 40 percent, although some mills charge a slightly lower percent (37 percent to 39 percent). The landlord's share of production must be paid out of the remainder of the crop after the mill deduction. As an example, with a 40 percent mill charge, the distribution of raw sugar production to various entities under a one-fifth and one-sixth crop share would be as follows:

	One-fifth crop share	One-sixth crop share
Mill share	40%	40%
Landlord share	12%	10%
Producer share	48%	50%

The relevant mill charge and landlord share percentages applicable to a particular tract of sugarcane land are important components in placing a value on the existing sugarcane crop for expropriation purposes. Since most of the sugarcane land in production is share rented, purchase of land currently in production would involve payment to the landowner for the land itself and payment to the producer for the existing crop. Payment to the producer is the focus of this bulletin. An implicit assumption made in this study is that the tract of land in question would no longer remain in sugarcane production after sale, due to eminent domain acquisition, hence the need for a procedure to value the existing crop to serve as a basis for compensation payment to the producer for the loss of the crop.

Production of sugarcane in Louisiana is currently in a transition phase in terms of major varieties planted. The variety CP 70-321 was the leading variety produced in Louisiana until 1998 (Faw, 1999a). In 1995, this variety accounted for 49 percent of the state's sugarcane acreage. In 1998, CP 70-321 represented only 29 percent of the state's acreage. Comparison of the percentages of plantcane and first stubble acreage with the percentages of second stubble and older stubble acreage for CP 70-321 for 1998 reveals lower percentages for more recently planted acreage (18 percent for plantcane and 29 percent for first stubble) than for earlier planted acreage (38 percent for second stubble and 51 percent for third stubble and older). This relationship is evidence that production of CP 70-321 is declining in the state. The variety LCP 85-384 is now the leading sugarcane variety produced in the state with 43 percent of the acreage in 1998. Evidence of the current production increase in LCP 85-384 acreage can be seen in the acreage distribution by crop age. Acreage of LCP 85-384 accounted for 58 percent of the state's total plantcane acreage and 44 percent of total first stubble acreage in 1998.

This transition phase from one leading variety to another has important consequences for the valuation of sugarcane associated with agricultural land sales. LCP 85-384 is a significantly higher-yielding sugarcane variety than other commercial varieties produced in the state. This is reflected in the outfield variety trial data presented in Table 1. The data in the table are results of variety performance from recent outfield variety trials conducted

Table 1. Sugarcane yield performance means from outfield tests, 1996-98

Variety[1]	Sugar yield	Cane yield	Theoretical recoverable Sugar	Stalk number	Stalk weight
	(lbs/acre)	(tons/acre)	(lbs/ton)	(no./acre)	(lbs)
Plantcane[2]					
CP 70-321	7,911	30.3	261	21,736	2.83
LCP 85-384	9,187	34.5	267	28,982	2.42
HoCP 85-845	8,008	33.0	243	25,286	2.63
First stubble[3]					
CP 70-321	7,982	29.2	274	23,115	2.54
LCP 85-384	9,711	35.3	275	35,167	2.03
HoCP 85-845	8,596	33.0	260	28,632	2.33
Second stubble[4]					
CP 70-321	7,282	27.1	269	24,171	2.26
LCP 85-384	9,563	33.9	282	40,649	1.70
HoCP 85-845	8,590	32.0	269	32,264	1.99
Third stubble[5]					
CP 70-321	6,029	22.9	268	23,671	1.95
LCP 85-384	7,809	28.8	270	39,413	1.47
HoCP 85-845	7,948	30.3	264	30,972	1.96

[1] Varieties listed are those recommended for major plantings in Louisiana in 1999.
[2] 1996-98 results; [3] 1997-98 results;[4] 1998 results;[2] 1997-98 results.
Source: Faw, Wade F., *Sugarcane Planted Recommendations and Suggestions for Louisiana Sugarcane Producers*, Louisiana Cooperative Extension Service, Louisiana State University Agricultural Center, 1999, pp. 5-6.

by the LSU Agricultural Center, the United States Department of Agriculture Sugarcane Research Unit, and the American Sugar Cane League (Faw, 1999b). In these tests, LCP 85-384 exhibited significantly higher average sugar yields per acre than CP 70-321 for plantcane through third stubble. Average sugar yields for LCP 85-384 were higher than HoCP 85-845 for plantcane through second stubble. The primary reasons for this increased yield are related to the variety's ability to produce higher tonnage and stalk populations per acre. As a result, when attempting to value growing sugarcane on a particular tract of land for sales purposes, the specific variety of sugarcane being grown, as well as the current age of the crop, are significant factors to consider.

Sugarcane Valuation Methods

Established appraisal methods exist for determining the value of growing crops associated with agricultural land sales. Most of these methods are utilized in valuing permanent plantings such as orchards and vineyards (American Institute of Real Estate Appraisers [AIREA], 1983). Permanent plantings present a distinctive dimension to land appraisal because of their plant life characteristics. In addition to the normal ground preparation, planting, and fertilizing, these specialized properties require a startup period of several years before a cash flow is realized. The orchard or vineyard has a period of peak production, followed by a period of declining production, unless the old trees or plants are removed and replaced as necessary. These specialized agricultural properties are typically found in one of three stages of development: (1) development or immaturity; (2) sustained maturity; or (3) decline. The particular valuation method used in a given situation depends upon the purpose and function of the appraisal, the stage of plant life development, and available data (Paddock, 1968).

Although not considered to be a permanent planting, sugarcane production can be evaluated within this same framework in terms of placing a value on a growing crop for the purpose of determination of compensation for production termination due to expropriation. Sugarcane may be considered to be a "short-lived" permanent planting. The three stages of development mentioned above are clearly evident in sugarcane production. Land preparation, planting, and plantcane cultivation activities occur over a period lasting almost two years before any income is realized (*development stage*). Although the highest yields are usually obtained from plantcane, the relatively small difference generally observed between plantcane and first stubble sugar yields could characterize these crop years as a period of sustained production (*sustained maturity stage*). Sugar yields begin to significantly decrease with the second stubble crop. The standard rotation in Louisiana has included harvest through the second stubble. With the release of LCP 85-384, some producers are harvesting third and fourth stubble crops on a routine basis, although yields decrease with each subsequent crop year. Therefore, the period of

production after harvest of the first stubble can be characterized as one of declining production (*decline stage*).

Three general valuation procedures exist for valuing specialized agricultural properties that contain perennial or permanent plantings: (1) the sales comparison approach; (2) the cost approach; and (3) the income capitalization approach. The most appropriate valuation method to use in a given situation depends upon several factors, the most important of which include the purpose and use of the appraisal, the stage of development of the plant life, and the data available (AIREA, 1983).

The sales comparison approach, or market data approach, involves placing a market value on a perennial or permanent planting based upon the sales value of similar plantings in comparable sales. This valuation procedure is commonly used to value permanent plantings which have an extremely long productive life, such as orchards, vineyards, and timberland. However, determining an accurate value based on sales of similar plantings is difficult for two primary reasons. First, directly comparable sales may be limited in quantity and difficult to locate. Second, because permanent plantings of the same crop are different in many respects, some adjustment in the comparable sales value is needed to accurately place a value on the planting in question (Healy and Bergquist, 1994).

The cost approach places a value on specialized agricultural plantings by determining the value of crops and other improvements that have been added to the land. This approach is most commonly used for immature plantings that have not reached maturity. To place a value on the immature crop, the cost approach estimates the value of improvements that have been added to the land. These improvements would generally include the costs associated with preparing the land and planting the crop, along with any cultivation or other production expenses incurred after planting. Some measure of entrepreneurial profit can also be included, although this measure may require adjustment based on the relative immaturity of the planting. As a perennial crop matures and harvest begins, the relevance of the cost approach declines (Paddock, 1968). However, the relevance of the cost approach would vary from one crop to another, depending upon the average crop cycle length.

The income capitalization approach attempts to place a value on the specialized crop by converting the income generated by the crop into a present value. The application of the income capitalization approach to permanent plantings may be somewhat complex due to the fact that permanent plantings are generally considered to be a wasting asset, although this may not always be reflected in the market (AIREA, 1983). Within the general income capitalization approach, there are several different methods of converting net income into value (Fisher and Clapp, 1985). Each of these methods is considered to reflect a value of a permanent planting for the sales property. An important consideration in using the income capitalization approach involves the selection of the appropriate frequency of discounting as well as the point within a time period at which costs and returns are determined (Albright, 1997). The particular income capitalization approach utilized in this study involves discounted cash flow analysis.

Although the sales comparison approach may be frequently used in valuing permanent plantings, factors such as the influence of variety differences, crop age, and other site-specific factors may limit its use in valuing growing sugarcane. Furthermore, the purpose of this bulletin is to determine the value of a sugarcane producer's investment in a growing crop as a measure of the producer's loss should the production be terminated due to eminent domain acquisition. This investment value will be different from the market value of the crop at any point since the market value can increase or decrease due to changes in the price of sugar.

Two valuation procedures, the cost approach and the income capitalization approach, are used in this report to value growing sugarcane. These two approaches explicitly incorporate the impact of variety, expected yields, and production costs into the valuation process. The current stage of the sugarcane crop at the time of sale may make one of these two valuation methods more appropriate to use than the other. However, the resulting pair of estimates from using both methods will serve the function of placing a range on the economic value of the growing crop.

Estimation Procedures

Production and Cost Data

Three representative sugarcane production scenarios are presented in this report to illustrate the impact of sugar yield and crop cycle length on the valuation of a sugarcane crop. The scenarios presented depict typical production situations for the two leading sugarcane varieties produced in the state. Scenario A represents production of the variety CP 70-321 in a standard rotation through harvest of second stubble crop. Scenario B represents production of CP 70-321 in an extended rotation through harvest of a third stubble crop. Scenario C represents production of the variety LCP 85-384 in an extended rotation through harvest of third stubble. For each production scenario, sugarcane yields, in tons of cane per acre, are taken from data in Table 1. A commercially recoverable sugar (CRS) factor of 200 pounds of raw sugar per ton of cane is used to convert sugarcane yields to raw sugar yields (Table 2). CRS factors for raw sugar

Table 2. Yield data for three representative sugarcane crop valuation scenarios

Yield	Scenario A CP 70-321 *(standard rotation)*	Scenario B CP 70-321 *(extended rotation)*	Scenario C LCP 85-384 *(extended rotation)*
Cane yield: *(tons per acre)*			
Plantcane	30.3	30.3	34.5
First stubble	29.2	29.2	35.3
Second stubble	27.1	27.1	33.9
Third stubble	--	22.9	28.8
Rotation total	86.6	109.5	132.5
Rotation average	28.9	27.4	33.1
Sugar yield:[1] *(lbs per acre)*			
Plantcane	6060	6060	6900
First stubble	5840	5840	7060
Second stubble	5420	5420	6780
Third stubble	--	4580	5760
Rotation total	17320	21900	26500
Rotation average	5773	5475	6625

[1] Sugar yield based on commercially recoverable sugar (CRS) value of 200 pounds per ton of cane.

mills in the state have averaged in the 200 pound range for the past few years and represent the actual amount of raw sugar mills are able to extract from the cane.

Sugarcane values presented in this report are based on the yield levels, sugar prices, and production costs assumed in the analysis. A change in assumed yield, price, or cost would change the resulting sugarcane value estimate. All estimates of sugarcane planting and production costs are taken from LSU Agricultural Center published estimates for 1999 (Champagne and Salassi, 1999). Relevant production and cost information for these three scenarios are presented in tables 2 and 3. Assignment of planting costs to crops within each rotation or crop cycle in each scenario were approximately one-third each to plantcane, first stubble, and second stubble. These planting costs assignments were based upon the percentage of producer net returns represented by each

Table 3. Estimated Sugarcane Production Costs in Louisiana for 1999

Production Phase	Time Period	Cost per Acre
Fallow field operations	March-April, year 1	$ 71
Seedbed preparation	May-August, year 1	$ 161
Planting cultured seedcane	September, year 0[1]	$ 654
Planting propagated seedcane	September, year 1	$ 154
Plantcane cultivation	February-November, year 2	$ 247
Plantcane harvest	December, year 2	$ 112
First stubble cultivation	February-October, year 3	$ 258
First stubble harvest	November, year 3	$ 112
Second stubble cultivation	February-September, year 4	$ 272
Second stubble harvest	October, year 4	$ 112
Third stubble cultivation	February-September, year 5	$ 272
Third stubble harvest	October, year 5	$ 112

[1] Cultured seedcane is generally purchased from a supplier, planted as seedcane for harvest the following year and replanted as propagated seedcane.

of the first three crop harvests. No planting costs are assigned to a third stubble crop since a standard production rotation has generally stopped after harvest of the second stubble crop. However, with the stubbling of LCP 85-384, the standard sugarcane production rotation in Louisiana could expand to a third stubble in the near future. A planting ratio of 6:1 and a discount rate of 6.4 percent were assumed. Raw sugar was valued at $0.21 per pound and molasses at $0.18 per gallon. The mill share was determined at 40 percent, with the landlord receiving one-fifth of the remainder, or 12 percent of the total production. The producer's share of production was 48 percent.

The Cost Approach

The cost approach estimates the value of improvements made to the land. In terms of sugarcane production, these improvements would take the form of expenses incurred by the producer (who in most cases will not be the landowner) to prepare land and plant sugarcane. This crop valuation method is most appropriate for immature plantings (before any returns have been realized), but it can be used at any stage of crop development. As estimated in this report, the cost approach is used to estimate the amount of money a producer has invested in the current crop. At the point a land sale may occur, the value of the sugarcane crop, as estimated by the cost approach, would be the amount of unrecovered investment by the producer in the crop up to that point plus some measure of an expected rate of return on the money invested. Unrecovered investment would include the total planting and cultivation expenses incurred less any planting and cultivation expenses allocated to a crop that has already been harvested and sold An average rate-of-return was calculated by dividing the present value of total expected net returns from the entire crop cycle by the present value of total planting and production costs invested in the crop over the entire crop cycle (Robinson and Barry, 1996). This percentage rate was then used to estimate the return on investment of money invested in the crop up to the time of sale. This total value would represent a minimum or lower bound on the value of the sugarcane crop that the seller (producer) should be willing to accept.

A fundamental assumption when using the cost approach to value sugarcane involves the allocation of planting costs to each successive sugarcane crop (plantcane, first stubble, second stubble, etc.). As defined here, planting costs for sugarcane include all costs associated with plowing out old stubble, fallow activities, seedbed preparation, and planting a new crop. These costs are allocated to the three harvest crops in a standard rotation (plantcane, first stubble, and second stubble) based upon the percentage of the net present value of returns for the entire crop rotation each harvest/crop stage represents. These percentages are directly related to the expected yields for each stage. Once a crop is harvested, the planting costs allocated to that crop stage are assumed to be recouped and are not included in further cost approach valuations of the crop. No planting costs are allocated to third stubble crops. An estimated return on investment is calculated using a rate of return that approximates the rate that would have been earned on the entire sugarcane crop cycle. This was estimated as the net present value of net returns from all crops divided by the net present value of all money invested. This rate is used to estimate a return on investment for planting and production costs invested in the crop up to the time of sale. The value of sugarcane using the cost approach may be stated generally in equation form as follows:

$$V_{ct} = (1+ROR) * [\sum_{i=1}^{t} PLTC_i(1+r)^{t-i} + \sum_{i=1}^{t} PRDC^i(1+r)^{t-i}]$$

where

V_{ct} = estimated value of sugarcane per acre in month t using the cost approach

ROR = estimated rate of return on money invested in growing sugarcane

$PLTC_i$ = unrecovered planting costs incurred in month i

$PRDC_i$ = unrecovered production costs incurred in month i

The Income Capitalization Approach

The income capitalization approach estimates the net present value of the investment in sugarcane production at any point in time. This approach is more appropriate to use when the sugarcane crop has reached a mature or sustained stage of production but can be used at any point in time. The basic calculation used in this report was to determine current year production costs, the appropriate allocated and unallocated planting costs, as well as the net present value of any future net returns (through the end of the crop cycle).

For valuation of immature sugarcane plantings (prior to harvest of the plantcane crop), the value of the sugarcane crop, as estimated under the income capitalization approach, would be equal to the present value of all planting and production costs invested in the crop at a point in time plus the net present value of expected net returns from current and future crop years (plantcane, first stubble, second stubble, etc.) through the end of the current crop cycle. Once a crop is harvested, the valuation of the remaining crop would equal the net present value of current production costs plus that portion of planting costs allocated to future crop years plus the net present value of expected net returns from future crop years. The value of sugarcane using the income capitalization approach may be stated generally in equation form as follows:

$$V_{It} = [\sum_{i=1}^{t} PLTC_i(1+r)^{t-i} + \sum_{i=1}^{t} PRDC_i(1+r)^{t-i}] + [\sum_{i=t}^{n} FNR_i/(1+r)^{n-t}]$$

where

V_{It} = estimated value of sugarcane per acre in month t using the income approach

$PLTC_i$ = unrecovered planting costs incurred in month i

$PRDC_i$ = unrecovered production costs incurred month i

FNR_i = estimated net returns from future harvests in the crop cycle

Results and Discussion

Estimated monthly values of sugarcane using these two valuation approaches are presented in tables 4-6 for the three representative production scenarios included in this study. The crop values in the tables represent estimates of the monetary value of a growing sugarcane crop under situations where the land is being purchased through eminent domain and will no longer remain in sugarcane production. In each table, plantcane is assumed to be sold, and gross returns received, at the end of December, first stubble at the end of November, and second stubble and third stubble at the end of October. The estimated value of the sugarcane crop in the harvest month includes accumulated production costs as well as assigned planting costs. Once the crop is harvested and sold, relevant production and planting costs associated with that particular crop are assumed to be recovered. Crop value estimates in the month following harvest include only unrecovered plantings costs (planting costs assigned to future crops) and any production or cultivation costs that may have occurred in that month. As a result, both valuation procedures report a sharp decrease in the crop value in the month immediately following harvest.

Monthly sugarcane crop value estimates for CP 70-321 in a four-year crop cycle with an average 5,773 pounds of raw sugar yield per harvested acre are presented in Table 4 for both the cost approach and the income capitalization approach. Estimated values of plantcane for the month of January, for example, were $260 per acre under the cost approach and $245 per acre under the income capitalization approach. Both of the estimates include all assigned planting costs as well as any production expenses that may have been incurred in the month of January.

At the yield level assumed in this scenario, the estimated crop values from the two valuation approaches are similar in magnitude. Values are slightly higher for plantcane and first stubble under the cost approach as a result of unallocated planting costs included in the cost approach being greater than the present value of net returns from future crops included in the income capitalization approach. Estimated values increase during the year as production and cultivation costs are incurred. Values for

Table 4. Monthly Estimated Value of Sugarcane Crop for Scenario A (CP 70-321 - standard rotation)[1]

Crop stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
					(dollars per acre)							
Plantcane[2]:												
Cost Approach[5]	260	280	380	430	461	532	562	579	595	606	618	630
Income Capitalization[6]	245	262	359	406	433	499	525	537	548	555	561	568
First Stubble[3]:												
Cost Approach	183	242	314	368	422	470	487	502	522	533	543	88
Income Capitalization	164	221	291	342	392	436	449	460	476	483	489	93
Second Stubble[4]:												
Cost Approach	98	156	227	284	353	389	405	424	443	453	-	-
Income Capitalization	110	166	236	291	357	390	403	412	434	440	-	-

[1] Harvest through second stubble; sugar yield per harvested acre (assuming 200 CRS)- plantcane (30.3 tons, 6060 lbs. sugar/acre), first stubble (29.2 tons, 5840 lbs. sugar/acre), second stubble (27.1 tons, 5420 lbs sugar/acre).

[2] Assumes plantcane is sold, and gross returns are received, at the end of December.

[3] Assumes first stubble is sold, and gross returns are received, at the end of November. December value for the cost approach represents monthly overhead costs and unrecovered planting costs. December value for the income capitalization approach includes monthly overhead costs, unrecovered planting costs, and the net present value of expected future net returns.

[4] Assumes second stubble is sold, and gross returns are received, at the end of October. November and December values for the cost approach represent monthly overhead costs. November and December values for the income capitalization approach include monthly overhead costs and the net present value of expected future net returns.

[5] Cost approach estimates net present value of current production investment plus a rate of return.

[6] Income capitalization approach estimates net present value of unrecovered production investment costs plus future net returns.

plantcane in the month of harvest (December) reflect all costs incurred up to the point of harvest. Once the plantcane crop is harvested, that portion of planting costs assigned to the plantcane crop is assumed to be recovered and only plantings costs assigned to the first and second stubble crops are carried forward. Monthly crop values for first and second stubble crops increase through the year as production and cultivation costs are incurred. Because the crop cycle depicted in Table 4 assumes the crop cycle ends with harvest of the second stubble crop, no crop value estimates are included for the months of November and December after harvest of the second stubble crop in October.

Sugarcane value estimates for CP 70-321 production over a five-year crop cycle are shown in Table 5. The average yield per harvested acre in this example is 5,475 pounds, as shown in Table 2. The only difference between this scenario and the one presented in Table 4 is the addition of a third stubble crop with a yield of 22.9 tons per acre. Estimated monthly values of sugarcane using the cost approach were very similar to those included in Table 4. The extension of the crop cycle to include harvest of a third stubble crop had little impact on the resulting crop values. Under the cost approach, the sugarcane crop is valued based upon the investment of planting, cultivation, and other production costs up to some point in time. The only additional costs incurred in scenario B are cultivation costs of the third stubble crop, as reflected in the cost approach values for third stubble. With the income capitalization approach, the addition of a third stubble crop did result in an increase in the resulting crop value estimate. However, with a third stubble yield of only 22.9 tons per acre, the present value of net returns from a third stubble crop was relatively small. Higher third stubble yields would result in a larger increase in crop value under the income capitalization approach.

Yield differences across different tracts of lands or farms will significantly affect the estimated values when using the income capitalization approach, as these yields are reflected in the net present value of net returns expected for a crop cycle. Estimates of crop value using the cost approach are not affected by yield differences other than in the allocation of planting costs, assuming no major differences in cultivation costs across varieties. The

Table 5. Monthly Estimated Value of Sugarcane Crop for Scenario B (CP 70-321 - extended rotation)[1]

Crop stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
					(*dollars per acre*)							
Plantcane[2]:												
Cost Approach[5]	260	279	379	429	460	530	560	577	591	602	614	625
Income Capitalization[6]	250	267	364	411	438	505	530	543	553	560	567	574
First Stubble[3]:												
Cost Approach	182	241	314	367	420	468	485	499	519	530	540	88
Income Capitalization	169	226	297	347	397	442	455	466	482	488	495	99
Second Stubble[4]:												
Cost Approach	98	155	227	283	352	388	403	422	441	450	4	4
Income Capitalization	115	172	242	297	363	396	409	424	440	446	10	10
Third Stubble[4]:												
Cost Approach	14	70	141	196	264	299	313	330	348	356	-	-
Income Capitalization	27	83	153	207	272	305	317	332	348	353	-	-

[1] Harvest through third stubble; sugar yield per harvested acre (assuming 200 CRS) - plantcane (30.3 tons, 6060 lbs. sugar/acre), first stubble (29.2 tons, 5840 lbs. sugar/acre), second stubble (27.1 tons, 5420 lbs. sugar/acre), third stubble (22.9 tons, 4580 lbs. sugar/acre).

[2] Assumes plantcane is sold, and gross returns are received, at the end of December.

[3] Assumes first stubble are sold, and gross returns are received, at the end of November. December value for the cost approach represents monthly overhead costs and unrecovered planting costs. December value for the income capitalization approach includes monthly overhead costs, unrecovered planting costs and the net present value of expected future net returns.

[4] Assumes second stubble and third stubble are sold, and gross returns are received, at the end of October. November and December values for the cost approach represent monthly overhead costs. November and December values for the income capitalization approach include monthly overhead costs and the net present value of expected future net returns.

[5] Cost approach estimates net present value of current production investment plus a rate of return.

[6] Income capitalization approach estimates net present value of unrecovered production investment costs plus future net returns.

impact of sugar yield on crop value (through income capitalization) can be easily seen by comparing values in tables 4-6. Table 6 presents estimated crop values for LCP 85-384, a variety with higher yield potential.

Yield differences have the greatest impact on the valuation of sugarcane when the income capitalization approach is used. The income capitalization approach directly incorporates the present value of future net returns into the crop value calculation. The impact of yield differences can be illustrated by comparing crop values for varieties with significantly different sugar yields. For a farm with expected harvest through second stubble and average yields for plantcane, first and second stubble of 30.3 tons, 29.2 tons, and 27.1 tons per acre, respectively (Table 4), the estimated value of unharvested plantcane in the month of January is $245 per acre under the income capitalization approach. With the addition of a harvest of a third stubble crop with a yield of 22.9 tons per acre, the value of plantcane in January increases to $250 per acre (Table 5). Table 6 reflects estimated crop values for a farm with above average sugarcane yields. In this scenario, the plantcane value in January increased to $659 per acre. Therefore, the expected sugar yield has a significant impact on valuation using the income capitalization approach. Valuation using this procedure should be estimated for each separate tract of land if sugar yields vary substantially from one tract to another. Sugar yields have little impact on valuation using the cost approach since this valuation procedure does not include net returns estimates directly. Expected yields would, however, influence the estimated rate of return calculation if this return measure were included in the final valuation estimate.

Table 6. Monthly Estimated Value of Sugarcane Crop for Scenario C (LCP 85-384 - extended rotation) [1]

Crop stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	(*dollars per acre*)											
Plantcane[2]:												
Cost Approach[5]	256	281	387	445	484	564	604	631	656	678	700	722
Income Capitalization[6]	659	678	777	827	856	925	952	967	980	989	998	1007
First Stubble[3]:												
Cost Approach	184	248	326	386	447	504	529	553	582	602	622	91
Income Capitalization	516	575	647	700	751	798	812	825	844	852	860	340
Second Stubble[4]:												
Cost Approach	100	161	237	299	374	417	440	466	493	511	4	4
Income Capitalization	358	416	487	543	611	645	659	676	693	701	125	126
Third Stubble[4]:												
Cost Approach	14	72	145	204	277	317	337	361	385	400	-	-
Income Capitalization	143	200	270	325	391	425	437	453	469	475	-	-

[1] Harvest through second stubble; sugar yield per harvested acre (assuming 200 CRS) - plantcane (34.5 tons, 6900 lbs. sugar/acre), first stubble (35.3 tons, 7060 lbs. sugar/acre), second stubble (33.9 tons, 6780 lbs. sugar/acre), third stubble (28.8 tons, 5760 lbs. sugar/acre).

[2] Assumes plantcane is sold, and gross returns are received, at the end of December.

[3] Assumes first stubble is sold, and gross returns are received, at the end of November. December value for the cost approach represents monthly overhead costs, and unrecovered planting costs. December value for the income capitalization approach includes monthly overhead costs, unrecovered planting costs and the net present value of expected future net returns.

[4] Assumes second stubble and third stubble are sold, and gross returns are received, at the end of October. November and December values for the cost approach represent monthly overhead costs. November and December values for the income capitalization approach include monthly overhead costs and the net present value of expected future net returns.

[5] Cost approach estimates net present value of current production investment plus a rate of return.

[6] Income capitalization approach estimates net present value of unrecovered production investment costs plus future net returns.

Summary and Conclusions

The production of sugarcane in Louisiana includes a crop cycle that can extend over a period of four to five, or more, years. Seedcane is planted with the expectation of achieving at least three to four harvests before replanting is necessary. As a result of the perennial nature of sugarcane, sales of agricultural land in the sugarcane production areas of Louisiana, through eminent domain acquisition by governmental entities, may involve tracts of land that include a growing crop of sugarcane. Since a majority of the sugarcane in Louisiana is produced on rented land, the producer of sugarcane is generally not the landowner.

Federal and state laws provide for the acquisition of private property for public use provided that a public need is shown and that owner of the property taken is justly compensated. Louisiana law states that the state or any domestic or foreign corporation may expropriate private property for public use provided that the property owners are compensated to the full extent of their loss. This bulletin focused on procedures to value an existing sugarcane crop as a basis for payment to a producer for loss of crop through eminent domain acquisition. An implicit assumption made throughout this study was that the tract of land in question would no longer remain in sugarcane production after sale, hence the need for a procedure to value the existing crop to serve as a basis for compensation payment to the producer.

Three general valuation procedures exist for valuing specialized agricultural properties such as sugarcane: (1) the sales comparison approach; (2) the cost approach; and (3) the income capitalization approach. The most appropriate valuation method to use in a given situation will depend upon several factors, the most important of which include the purpose and use of the appraisal, the stage of development of the plant life, and the crop characteristics of the specific tract in question. For sugarcane, the most important factors to consider are the expected yields and the expected length of the crop cycle, as well as planting and production costs associated with the crop.

The cost approach and the income capitalization approach were determined to be the most relevant valuation methods to use in valuing existing sugarcane crops. The cost approach determines the present value of planting and production costs invested in a crop at a point in time plus a rate of return measure on that investment, while the income capitalization approach includes a measure of the present value of future net returns from harvests which will be foregone as a result of the land sale.

Three general conclusions may be drawn from the results of this study. First, results of the study show that the estimated value of a sugarcane crop, for eminent domain acquisition valuation purposes, should increase throughout the year as cultivation and production costs are incurred. As production costs increase throughout the year, the cumulative investment by the producer in that crop increases. If the land should be sold later in the year rather than earlier, the producer should be compensated for this cumulative increase in investment in the crop. Both valuation procedures analyzed in this study reflect this relationship.

Second, extension of the crop cycle as well as variety differences can significantly affect the value of a sugarcane crop when using the income capitalization approach. This valuation procedure accounts for lost future net income as a result of eminent domain acquisition more directly than the cost approach. The magnitude of these estimated values depends upon the expected crop cycle length and sugar yield of the tract of land in question.

Third, when valuing a tract of sugarcane land for possible eminent domain sale, both valuation procedures should probably be utilized in order to provide information on the extent of a producer's loss. The cost approach will provide a measure of the monetary investment in the production of the crop, while the income capitalization approach will provide a measure of a producer's foregone future income.

Literature Cited

Albright, Sr., Stephen J., "Selecting the Appropriate Frequency of Discounting," *The Appraisal Journal*, Vol. 65, No. 4, October 1997, pp. 254-360.

American Institute of Real Estate Appraisers (AIREA), *The Appraisal of Rural Property*, Chicago, Illinois,1983, pp. 307-326.

Champagne, Lonnie P., and Michael E. Salassi, *Projected Costs and Returns - Sugarcane, Louisiana 1999*, Department of Agricultural Economics and Agribusiness, Louisiana Agricultural Experiment Station, LSU Agricultural Center, A.E.A. Information Series No. 175, January 1999.

Faw, Wade F., "The 1998 Louisiana Sugarcane Variety Survey," *Sugarcane Research Annual Progress Report, 1998*, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, 1999a, pp. 102-107.

Faw, Wade F., *Sugarcane Planting Recommendations and Suggestions for Louisiana Sugarcane Producers*, Louisiana Cooperative Extension Service, Louisiana State University Agricultural Center, 1999b, pp. 5-6.

Fisher, Donald A., and Arthur E. Clapp, "Using the Income Approach for Specialized Agricultural Properties," *Journal of the American Society of Farm Managers and Rural Appraisers*, Vol. 49, No. 1, April 1985, pp. 38-46.

Healy, Jr., Martin J., and Kevin Bergquist, "The Sales Comparison Approach and Timberland Valuation," *The Appraisal Journal*, Vol. 62, No. 4, October 1994, pp. 587-595.

Henning, Steven A., Lonnie R. Vandeveer, Gary A. Kennedy, Rebecca Summers, and Janis B. Breaux, *Louisiana Rural Land Values and Tenure Arrangements, 1997*, Department of Agricultural Economics and Agribusiness, Louisiana Agricultural Experiment Station, LSU Agricultural Center, A.E.A. Information Series No. 167, August 1998.

Louisiana Agricultural Statistics Service, *1998 Louisiana Sugarcane County Estimates Report*, July 1999.

Louisiana Cooperative Extension Service, *1998 Progress Report*, Louisiana State University Agricultural Center, 1998a.

Louisiana Cooperative Extension Service, *Louisiana Summary: Agricultural & Natural Resources, 1998*, Louisiana State University Agricultural Center, 1998b.

Paddock, James C., "California Orchard and Vineyard Appraisals," *The Appraisal Journal*, October 1968, pp. 576-588.

Robinson, Lindon J., and Peter J. Barry, *Present Value Models and Investment Analysis*, The Academic Page, 1996.

Suter, Robert C., *The Appraisal of Farm Real Estate*, Retus, Inc., West Lafayette, Indiana, third edition, 1992.

West's Louisiana Statutes Annotated, West Publishing Co., St. Paul, MN, 1999.

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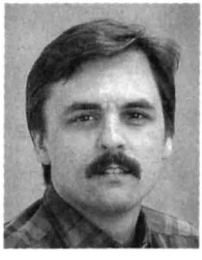

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